

CLAIMS

1. A luminescence system, wherein a first chemical substance changes into a second chemical substance having a chemical structure that is different from that of the first chemical substance and thereby luminesces.

2. The luminescence system according to Claim 1, wherein the second chemical substance turns back into the first chemical substance after luminescence.

3. A method of luminescence of a chemical substance, the method comprising injecting an electric charge into a first chemical substance so as to form an oxidized form or a reduced form of a second chemical substance having a chemical structure that is different from that of the first chemical substance, and further injecting an electric charge that is opposite to the above electric charge so as to form an excited state of the second chemical substance to thereby make it luminesce.

4. The method of luminescence according to Claim 3, wherein the second chemical substance turns back into the first chemical substance after luminescence.

5. A chemical substance for luminescence, wherein a first chemical substance changes into a second chemical substance having a chemical structure that is different from that of the first chemical substance and thereby luminesces.

6. The chemical substance for luminescence according to Claim 5, wherein the second chemical substance turns back into the first chemical substance after luminescence.

7. The chemical substance for luminescence according to either Claim 5 or 6, wherein the second chemical substance is formed via a bond formation reaction from the first chemical substance.

8. The chemical substance for luminescence according to either Claim 5 or 6, wherein the second chemical substance is formed via a bond cleavage reaction from the first chemical substance.

9. The chemical substance for luminescence according to any one of

Claims 5 or 7, wherein the second chemical substance turns back into the first chemical substance via a bond cleavage reaction.

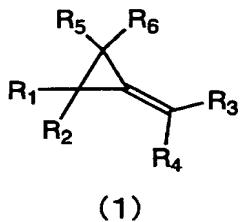
10. The chemical substance for luminescence according to any one of Claims 5, 6, or 8, wherein the second chemical substance turns back into the first chemical substance via a bond formation reaction.

11. The chemical substance for luminescence according to any one of Claims 5 to 10, wherein the second chemical substance is an open-shell species having monoradical or biradical.

12. The chemical substance for luminescence according to any one of Claims 5 to 11, wherein the ground-state multiplicity of the second chemical substance is a triplet.

13. The chemical substance for luminescence according to any one of Claims 5 to 12, wherein it is represented by Formula (1) below

[Chem. 1]

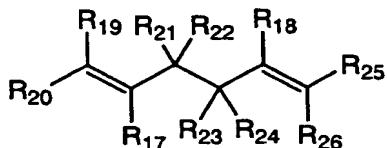


(in the formula, R₁ to R₆ denote a hydrogen atom, a halogen atom, a cyano group, a nitro group, a hydroxyl group, a mercapto group; a straight-chain, cyclic, or branched alkyl group, alkoxy group, or alkylthio group having 1 to 22 carbons; an aryl group having 6 to 30 carbons, a heteroaryl group having 2 to 30 carbons, an aryloxy group having 6 to 30 carbons, a heteroaryloxy group having 2 to 30 carbons, an arylthio group having 6 to 30 carbons, a heteroarylthio group having 2 to 30 carbons, or an aralkyl group having 7 to 30 carbons, R₁ to R₆ may be identical to or different from each other; and, furthermore, R₁ to R₆ may have a substituent selected from the group consisting of -R₇, -OR₈, -SR₉, -OCOR₁₀, -COOR₁₁, -SiR₁₂R₁₃R₁₄, and -NR₁₅R₁₆ (here, R₇ to R₁₆ denote a hydrogen atom, a halogen atom, a cyano group, a nitro

group; a straight-chain, cyclic, or branched alkyl group having 1 to 22 carbons, or a halogen-substituted alkyl group in which part or all of the hydrogen atoms of the above are substituted with a halogen atom; an aryl group having 6 to 30 carbons, a heteroaryl group having 2 to 30 carbons, or an aralkyl group having 7 to 30 carbons, or a halogen-substituted aryl group, halogen-substituted heteroaryl group, or halogen-substituted aralkyl group in which part or all of the hydrogen atoms of the above are substituted with a halogen atom, and R₇ to R₁₆ may be identical to or different from each other)).

14. The chemical substance for luminescence according to any one of Claims 5 to 12, wherein it is represented by Formula (4) below

[Chem. 2]



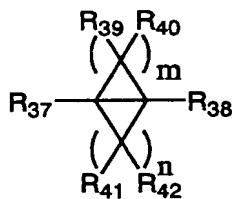
(4)

(in the formula, R₁₇ to R₂₆ denote a hydrogen atom, a halogen atom, a cyano group, a nitro group, a hydroxyl group, a mercapto group; a straight-chain, cyclic, or branched alkyl group, alkoxy group, or alkylthio group having 1 to 22 carbons; an aryl group having 6 to 30 carbons, a heteroaryl group having 2 to 30 carbons, an aryloxy group having 6 to 30 carbons, a heteroaryloxy group having 2 to 30 carbons, an arylthio group having 6 to 30 carbons, a heteroarylthio group having 2 to 30 carbons, or an aralkyl group having 7 to 30 carbons, R₁₇ to R₂₆ may be identical to or different from each other; and, furthermore, R₁₇ to R₂₆ may have a substituent selected from the group consisting of -R₂₇, -OR₂₈, -SR₂₉, -OCOR₃₀, -COOR₃₁, -SiR₃₂R₃₃R₃₄, and -NR₃₅R₃₆ (here, R₂₇ to R₃₆ denote a hydrogen atom, a halogen atom, a cyano group, a nitro group; a straight-chain, cyclic, or branched alkyl group having 1 to 22 carbons, or a halogen-substituted alkyl group in which part or all of the hydrogen atoms of the

above are substituted with a halogen atom; an aryl group having 6 to 30 carbons, a heteroaryl group having 2 to 30 carbons, or an aralkyl group having 7 to 30 carbons, or a halogen-substituted aryl group, halogen-substituted heteroaryl group, or halogen-substituted aralkyl group in which part or all of the hydrogen atoms of the above are substituted with a halogen atom, and R₂₇ to R₃₆ may be identical to or different from each other)).

15. The chemical substance for luminescence according to any one of Claims 5 to 12, wherein it is represented by Formula (7) below

[Chem. 3]

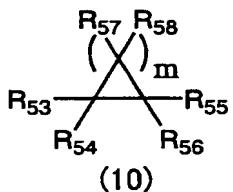


(7)

(in the formula, R₃₇ to R₄₂ denote a hydrogen atom, a halogen atom, a cyano group, a nitro group, a hydroxyl group, a mercapto group; a straight-chain, cyclic, or branched alkyl group, alkoxy group, or alkylthio group having 1 to 22 carbons; an aryl group having 6 to 30 carbons, a heteroaryl group having 2 to 30 carbons, an aryloxy group having 6 to 30 carbons, a heteroaryloxy group having 2 to 30 carbons, an arylthio group having 6 to 30 carbons, a heteroarylthio group having 2 to 30 carbons, or an aralkyl group having 7 to 30 carbons, R₃₇ to R₄₂ may be identical to or different from each other; furthermore, R₃₇ to R₄₂ may have a substituent selected from the group consisting of -R₄₃, -OR₄₄, -SR₄₅, -OCOR₄₆, -COOR₄₇, -SiR₄₈R₄₉R₅₀, and -NR₅₁R₅₂ (here, R₄₃ to R₅₂ denote a hydrogen atom, a halogen atom, a cyano group, a nitro group; a straight-chain, cyclic, or branched alkyl group having 1 to 22 carbons, or a halogen-substituted alkyl group in which part or all of the hydrogen atoms of the above are substituted with a halogen atom; an aryl group having 6 to 30 carbons, a

heteroaryl group having 2 to 30 carbons, or an aralkyl group having 7 to 30 carbons, or a halogen-substituted aryl group, halogen-substituted heteroaryl group, or halogen-substituted aralkyl group in which part or all of the hydrogen atoms of the above are substituted with a halogen atom, and R₄₃ to R₅₂ may be identical to or different from each other), and m and n are integers of 1 to 3).

16. The chemical substance for luminescence according to any one of Claims 5 to 12, wherein it is represented by Formula (10) below
[Chem. 4]



(in the formula, R₅₃ to R₅₈ denote a hydrogen atom, a halogen atom, a cyano group, a nitro group, a hydroxyl group, a mercapto group; a straight-chain, cyclic, or branched alkyl group, alkoxy group, or alkylthio group having 1 to 22 carbons; an aryl group having 6 to 30 carbons, a heteroaryl group having 2 to 30 carbons, an aryloxy group having 6 to 30 carbons, a heteroaryloxy group having 2 to 30 carbons, an arylthio group having 6 to 30 carbons, a heteroarylthio group having 2 to 30 carbons, or an aralkyl group having 7 to 30 carbons, R₅₃ to R₅₈ may be identical to or different from each other; furthermore, R₅₃ to R₅₈ may have a substituent selected from the group consisting of -R₅₉, -OR₆₀, -SR₆₁, -OCOR₆₂, -COOR₆₃, -SiR₆₄R₆₅R₆₆, and -NR₆₇R₆₈ (here, R₅₉ to R₆₈ denote a hydrogen atom, a halogen atom, a cyano group, a nitro group; a straight-chain, cyclic, or branched alkyl group having 1 to 22 carbons, or a halogen-substituted alkyl group in which part or all of the hydrogen atoms of the above are substituted with a halogen atom; an aryl group having 6 to 30 carbons, a heteroaryl group having 2 to 30 carbons, or an aralkyl group having 7 to 30 carbons, or a halogen-substituted aryl group, halogen-substituted heteroaryl group, or halogen-substituted aralkyl group in which part or all of the hydrogen atoms of the

above are substituted with a halogen atom, and R₅₉ to R₆₈ may be identical to or different from each other), and m is an integer of 1 to 3).

17. A luminescent device comprising the chemical substance for luminescence according to any one of Claims 5 to 16.

18. An electroluminescent device comprising the chemical substance for luminescence according to any one of Claims 5 to 16.

19. A mixture for luminescence comprising the chemical substance for luminescence according to any one of Claims 5 to 16, and a low molecular weight compound and/or a high molecular weight compound.